

**Tennessee Department of Environment and Conservation
Division of Underground Storage Tanks
Office of the Director**

Regulatory Interpretive Memo

DATE: July 2, 2003

TO: All UST Division Staff

FROM: Clint Willer

SUBJECT: SUMP SENSORS

QUESTION: Can sump sensors be used in lieu of an automatic line leak detector to satisfy all requirements for pressurized piping systems?

SCOPE OF THIS DISCUSSION

In July 1999, the Division of Underground Storage Tanks issued a revised Compliance Guidance Document–108 (CGD-108), Requirements for Interstitial Monitoring. One of the 1999 revisions to the 1996 version of CGD-108 was the following:

Electronic sump sensors may be used for pressurized piping systems if they:

- *Are part of a secondary containment system for piping;*
- *Provide a positive shutoff of the submersible pump in case the sensor comes into contact with a liquid or regulated substance; and*
- *Operate in a normally closed circuit such that a malfunction of the sensor or an interruption of power would cause the submersible pump to shutoff.*

CGD–110 Requirements for Leak Detection on Underground Pressurized Piping contained a similar reference to the use of sump sensors worded as follows:

Sump Sensors:

Sump sensors installed in secondary containment systems which operate continuously and provide a positive shutoff of the submersible pump when the presence of petroleum is detected may be used to satisfy both requirements for catastrophic and monthly line leak detection.

The Division took a position that allowed sump sensors to be used when conditions listed in CGD-108 were met. This position made it possible for automatic line leak detectors to be omitted from piping configurations when the above conditions were met. At the time this decision was made several things were not anticipated:

1. It was not anticipated that there would be a need to determine if the interstitial space was contiguous around product piping to the sump. This must be the case, because if there is a breach in the secondary piping, a leak in the primary pipe may never get to the sump sensor.
2. It was not anticipated that there must be a means of testing the integrity of the secondary pipe to determine if the integrity has been compromised. This means the secondary containment system must be capable of being tested and periodic tests performed. Our rules do not require such testing, so it is possible for the integrity of the secondary containment to be compromised and the tank owner/operator never know. It is also possible that the integrity of the secondary containment doesn't exist because it was never installed that way.
3. It was not anticipated that there would need to be some way to determine if the piping sloped properly to allow all escaped product to drain to the sump.
4. It was not anticipated that there is a need for the submersible sump where it is attached to the tank to be liquid tight and there is no current rule requiring that. If the sump is not liquid tight, product could enter the sump and leave the sump at any loose fitting or opening and never trigger an alarm at the sensor unless there was a catastrophic release.
5. It was not anticipated that there is a need for the sensor to be placed at the lowest level in the sump below any openings in the sidewall of the sump and that tank owners might not place sump sensors in that position.
6. It was not anticipated that some sump sensors would merely signal an alarm on the ATG console and not interrupt power to the submersible.
7. It was not anticipated that some tank owners/operators would disable these sensors when they gave false alarms due to water entering the sumps and triggering the sensors.
8. It was not anticipated that some tank owners/operators would simply think that the Division allows the use of sump sensors, and never try to understand the circumstances under which the Division allowed them. The Division assumed that tank owners/operators would only use sump sensors under the conditions set forth in the CGDs and not use them otherwise. Inspections revealed that tank owners/operators were relying on sump sensors although the conditions expressed in the CGDs were not adhered to.
9. It was not anticipated that the conditions expressed in the CGD for use with sump sensor application is not required in current rules and cannot be enforced if not adhered to by the tank owner/operator. If a tank owner/operator is unwilling to implement the conditions described in the CGDs the Division may lack the ability to require them to do so.
10. It was not anticipated that some of the conditions described in the CGD for sump sensor use could not easily be verified by inspectors.
11. It was not anticipated that important conditions essential to the successful use of sump sensors as a leak detection method might have been omitted from the CGDs.
12. It was not anticipated that some of these sensors would simply fail to operate and thus fail to detect and/or stop a catastrophic release.

Given what was known and unknown at the time the Division made its decision with respect to the use of sump sensors, the Division's position on the use of sump sensors should be reevaluated.

**APPLICABLE TENNESSEE PETROLEUM
UNDERGROUND STORAGE TANK REGULATIONS**

Rule 1200-1-15-.04

(2)(b) Piping. Underground piping that routinely contains petroleum shall be monitored for releases in a manner that meets one of the following requirements:

1. Pressurized piping. Underground piping that conveys petroleum under pressure shall:

- (i) Be equipped with an automatic line leak detector conducted in accordance with Rule 1200-1-15-.04(4)(a); and
- (ii) Have an annual line tightness test conducted in accordance with Rule 1200-1-15-.04(4)(b) or have monthly monitoring conducted in accordance with Rule 1200-1-15-.04(4)(c).

(4) Methods of release detection for piping. Each method of release detection for piping used to meet the requirements of Rule 1200-1-15-.04(2) shall be conducted in accordance with the following:

- (a) Automatic line leak detectors. Methods which alert the operator to the presence of a leak by restricting or shutting off the flow of petroleum through piping or triggering an audible or visual alarm may be used only if they detect leaks of 3 gallons per hour at 10 pounds per square inch line pressure within 1 hour. An annual test of the operation of the leak detector shall be conducted in accordance with the manufacturer's requirements.
- (b) Line tightness testing. A periodic test of piping may be conducted only if it can detect a 0.1 gallon per hour leak rate at one and one-half times the operating pressure.
- (c) Applicable tank methods. Any of the methods in Rule 1200-1-15-.04(3)(e) through (i) may be used if they are designed to detect a release from any portion of the underground piping that routinely contains petroleum.

DISCUSSION & ANALYSIS

The Division exercised discretion with respect to Rule 1200-1-15-.04(4)(c) and allowed sump sensor use by virtue of the provision in Rule 1200-1-15-.04(1)(2) which allows applicable tank methods to be used for piping. With respect to piping leak detection Rule 1200-1-15-.04(1)(2) says:

The Division may approve another method *if the owner and operator can demonstrate* that the method can detect a release as effective as any of the methods allowed in subparagraphs (c)-(h) of Rule 1200-1-15-.04(3). In comparing methods, *the Division shall consider the size of release that the method can detect and the frequency and reliability with which it can be detected*. If the method is approved, the owner and operator shall *comply with any conditions imposed by the Division on its use* to ensure the protection of human health and the environment. *(italics added)*

Sump sensors are a form of interstitial monitoring. Interstitial monitoring is one of the monthly monitoring methods of release detection referenced in Rule 1200-1-15-.04(3)(g) which reads:

Interstitial monitoring. Interstitial monitoring between the UST system and a secondary barrier immediately around or beneath it may be used, but only if the system is designed, constructed and installed to detect a leak from any portion of the tank that routinely contains petroleum and also meets one of the following requirements:

1. For double-walled UST systems, the sampling or testing method can detect a release through the inner wall in any portion of the tank that routinely contains petroleum;

It is obvious from the list of issues that were not anticipated by the Division in 1999 when it allowed the use of sump sensors, that the requirements for interstitial monitoring in Rule 1200-1-15.04(3)(g) when applied to sump sensors are not sufficient to guarantee detection of a release, and thus “ensure the protection of human health and the environment”.

The State Water Resources Control Board in California published a study dated August 2002 entitled “Field Evaluation of Underground Storage Tank System Leak Detection Sensors”. This study gathered data from 789 sensors at 124 locations and found that:

“Approximately 12% of sensors had one or more problems at the time of testing. The most common problems observed were sensors raised from the low point of the secondary containment, sensors failing to alarm when tested, and sensors failing to shut down the turbine pump in the event of an alarm (when programmed to do so).”

All of these sensor shortcomings have been discovered in Tennessee. The California study also found significant problems with secondary containment systems:

“Problems with the performance of secondary containment were more common than problems with sensors. Secondary containment must be kept clean and dry in order for sensors to perform properly; however, water was found in over 10% of secondary containment systems. Liquid product was present in an additional 3.5% of systems. Overall, 31% of the facilities visited in this field evaluation had water or product in one or more areas of the secondary containment system.”

Significant recommendations were made regarding the status of sensor use in California. California has had a very progressive UST program for years and realizes shortcomings with sensor use.

Perhaps the most troubling situation that could be encountered would be a catastrophic release in which a secondary containment system failed to contain released product or overflowed with released product. This situation could happen when sump sensors alone are relied upon to interrupt power to the submersible pump and it doesn't happen. Automatic line leak detectors required for pressurized piping are designed to prevent catastrophic and potentially disastrous results from product releases.

The Division has several options with respect to sump sensors:

Option 1 - Continue to allow their use with no change in the current position.

Option 2 - Disallow the use of sump sensors as a method of leak detection altogether.

Option 3 - Allow sump sensors on a case-by-case basis subsequent to Division review and approval.

Option 4 - Rescind the current position to allow development of specific rules applicable to sump sensor use.

Option 5 - Allow the use of sump sensors for monthly monitoring, but also require a separate means for catastrophic line leak detection.

Option 1 does not “ensure the protection of human health and the environment” as the Division is charged to do.

Option 2 may be overreacting unnecessarily and discarding a valuable method of continuous monitoring.

Option 3 is not realistic given several factors:

1. There is no way to know where sump sensors are in use at present, so there is no way to know what facilities need evaluation.
2. Staff does not currently have the expertise to evaluate all conditions necessary for appropriate sensor use, since those conditions have yet to be developed.
3. Lack of ‘as built’ information will make it impossible for some site conditions to be verified.

Option 4 is realistic and will allow the necessary thought and research to occur and thus a workable solution for sump sensor use to be developed.

Option 5 is also realistic and provides a solution to a serious concern regarding catastrophic releases.

DECISION

As of July 15, 2003, the Division will no longer recognize the use of sump sensors alone as meeting the requirements for pressurized piping. As of that date, individuals will be instructed that they must comply with Rule 1200-1-15-.04(2)(b) which requires an automatic line leak detector for all pressurized piping systems.

Central Office staff will publicize this change in the Division’s position through all available channels.

Inspectors are advised to inform tank owners/operators who utilize sump sensors that they must also add automatic line leak detectors or they will be in violation of Rule 1200-1-15-.04(2)(b) if they fail to do so. Sufficient time should be given for tank owners/operators to get this equipment installed and they should provide inspectors evidence they have complied.

Tank owners/operators who have sump sensors may continue to use them for monthly monitoring while the Division develops specific rules regarding their use. Tank owners/operators who continue to use sump sensors must agree to the following conditions regarding their use [per Rule 1200-1-15-.04(1)(2)]:

1. Tank owners/operators must be able to provide documentation that demonstrates that product loss from any location in a primary pipe will be fully contained in secondary piping and be conveyed to a sump where a sensor is located.
2. An annual functional test must be conducted for each sensor and results documented. Any time a sensor is found to be non-functional and/or is non-operational, it must be immediately repaired or replaced.
3. Tank owners/operators must agree to keep sumps clean, dry, and free of debris and remove anything that would interfere with sensor operation.
4. Sensors must be placed at the lowest point in the sump where liquid can accumulate.

5. Tank owners/operators may not render sensors inoperable in the event of groundwater entering the sump or for any other reason. Doing so would be a failure to have line leak detection.
6. Tank owners/operators must create a record each month indicating that they have physically (visually) inspected each sump equipped with a sensor and verified that no releases have occurred. If this record can be created by electronic means from an ATG console that would be acceptable.

If a tank owner/operator is unable to document the required site conditions or is unwilling to create the record, he will be expected to conduct an annual line tightness test or employ another means of monthly monitoring for pressurized piping. An affidavit will be provided for the tank owner/operator to execute describing the conditions that are agreed to in order to continue using sump sensors. Once rules specific to sump sensor use are in place, the affidavit may be discontinued.

The Division will draft rules specific to the use of sump sensors and seek their implementation.

If you have any questions about this, contact Lamar Bradley at 615-532-0952.